Agent-Based Social Systems

Volume 7

Editor in Chief:
Hiroshi Deguchi, Yokohama, Japan

Series Editors:
Shu-Heng Chen, Taiwan, ROC
Claudio Cioffi-Revilla, USA
Nigel Gilbert, UK
Hajime Kita, Japan
Takao Terano, Japan

For other titles published in this series, go to
www.springer.com/series/7188
ABSS–Agent-Based Social Systems

This series is intended to further the creation of the science of agent-based social systems, a field that is establishing itself as a transdisciplinary and cross-cultural science. The series will cover a broad spectrum of sciences, such as social systems theory, sociology, business administration, management information science, organization science, computational mathematical organization theory, economics, evolutionary economics, international political science, jurisprudence, policy science, socioinformation studies, cognitive science, artificial intelligence, complex adaptive systems theory, philosophy of science, and other related disciplines.

The series will provide a systematic study of the various new cross-cultural arenas of the human sciences. Such an approach has been successfully tried several times in the history of the modern science of humanities and systems and has helped to create such important conceptual frameworks and theories as cybernetics, synergetics, general systems theory, cognitive science, and complex adaptive systems.

We want to create a conceptual framework and design theory for socioeconomic systems of the twenty-first century in a cross-cultural and transdisciplinary context. For this purpose we plan to take an agent-based approach. Developed over the last decade, agent-based modeling is a new trend within the social sciences and is a child of the modern sciences of humanities and systems. In this series the term “agent-based” is used across a broad spectrum that includes not only the classical usage of the normative and rational agent but also an interpretive and subjective agent. We seek the antinomy of the macro and micro, subjective and rational, functional and structural, bottom-up and top-down, global and local, and structure and agency within the social sciences. Agent-based modeling includes both sides of these opposites. “Agent” is our grounding for modeling; simulation, theory, and real-world grounding are also required.

As an approach, agent-based simulation is an important tool for the new experimental fields of the social sciences; it can be used to provide explanations and decision support for real-world problems, and its theories include both conceptual and mathematical ones. A conceptual approach is vital for creating new frameworks of the worldview, and the mathematical approach is essential to clarify the logical structure of any new framework or model. Exploration of several different ways of real-world grounding is required for this approach. Other issues to be considered in the series include the systems design of this century’s global and local socioeconomic systems.

Editor in Chief
Hiroshi Deguchi
Chief of Center for Agent-Based Social Systems Sciences (CABSSS)
Tokyo Institute of Technology
4259 Nagatsuta-cho, Midori-ku, Yokohama 226-8502, Japan

Series Editors
Shu-Heng Chen, Taiwan, ROC
Claudio Cioffi-Revilla, USA
Nigel Gilbert, UK
Hajime Kita, Japan
Takao Terano, Japan
Simulating Interacting Agents and Social Phenomena

The Second World Congress
Preface

We are pleased to publish Simulating Interacting Agents and Social Phenomena: The Second World Congress as the post-proceedings of the Second World Congress on Social Simulation (WCSS ’08) held at George Mason University in the United States, 14–17 July 2008.

As the papers selected for this volume testify, computational social science continues to grow as a dynamic scientific interdisciplinary field driven by the medium of computing. The innovations in the field include new concepts, theories, models, and methodologies across a broad variety of approaches, including social simulation, complexity-theoretic research, social network analysis, automated information extraction algorithms, and related information-processing approaches to understanding and explaining human and social dynamics. Moreover, the contributions span the five classical disciplines of social science—anthropology, economics, sociology, political science, and social psychology—because no social science today lacks significant advances brought about by the computational approach.

In addition, the presence of computational social science and social simulation is also contributing new knowledge in interdisciplinary areas, such as management science, organization theory, social geography, communication, archaeology, and the policy sciences. Quite often, what unites these diverse investigations is precisely the computational approach, typified but not exclusively represented by social simulation and agent-based modeling.

From the perspective of just how deep computational approaches have penetrated the investigation of social phenomena at all levels, it is significant to note that practically all areas or subfields of specialization in social science by now have witnessed some computational contributions. For example, as demonstrated by chapters in this volume, economics is witnessing computational social simulation contributions in specialized areas as diverse as finance, markets, and microeconomics, as well as international trade and development. Similarly, in political science computational contributions now cover comparative politics as well as international relations, among other subfields. In anthropology, both cultural anthropology and anthropological archaeology are also witnessing significant computational advances. In other words, the penetration of computational approaches is deep and lasting, to the benefit of scientific progress.

The papers included in this volume were selected by a rigorous process of double peer review. First, all papers accepted for presentation at the Second World
Congress on Social Simulation were selected by a peer-review system whereby the selected papers were revised based on reviewers’ feedback. Second, following the congress, an additional review of selected papers was conducted, resulting in further revisions that finally led to the chapters included in this volume. We are very grateful to the members of the Program Committee who dedicated time and talent to this rigorous process.

The Second World Congress on Social Simulation held at George Mason University, near Washington DC, followed the excellent international tradition established by the First World Congress held at Kyoto University two years earlier, by hosting scholars from many countries. These included Australia, Brazil, Ecuador, France, Germany, Italy, Japan, Poland, Rumania, the Netherlands, the Russian Federation, Spain, Sweden, Switzerland, Taiwan, the United Kingdom, and the United States, among many others. This vast international participation was due to the hard work of the regional associations that have jointly sponsored the World Congress series, namely, the Pacific Area Association for Agent-based Social Systems Science (PAAA), the European Social Simulation Association (ESSA), and the North American Association for Computational Social and Organizational Sciences (NAACSOS), which has now been reorganized as the Computational Social Science Society (CSSS, or C-Triple-S). Already the next international conference, the Third World Congress on Social Simulation (WCSS ’10) at Kaasel University, Germany, 6–9 September 2010, is being organized as this volume is being published.

As editors, we wish to express deep appreciation to Professor Hiroshi Deguchi, Tokyo Institute of Technology, and the editorial staff at Springer Japan, who facilitated the publication of this volume in the ABSS Series. Besides the many academic faculty and professionals who contributed to the success of the Second World Congress, we are grateful to the many students from around the world who participated with papers and posters. Students added a vibrant and meritorious representation of the next generation of future computational social scientists and social simulation experts. Finally, a word of sincere gratitude to the administrative staff that supported the local committee at the Mason Center for Social Complexity, especially Christina Bishop and Beth Gronke, as well as the conference web site developer, Nicolas Dumoulin, from Laboratoire d’Ingénierie des Systèmes Complexes (Cemagref, France), who worked many hours beyond the call of duty to ensure an excellent international congress.

Editors

Keiki Takadama (PAAA)
Claudio Cioffi-Revilla (CSSS)
Guillaume Deffaunt (ESSA)
Contents

Part I  Norms, Diffusion and Social Networks

A Classification of Normative Architectures .......................................................... 3
Martin Neumann

The Complex Loop of Norm Emergence: A Simulation Model ......................... 19
Giulia Andrisghetto, Marco Campennì, Federico Cecconi, and Rosaria Conte

A Social Network Model of Direct Versus Indirect Reciprocity
in a Corrections-Based Therapeutic Community ............................................. 37
Nathan Doogan, Keith Warren, Danielle Hiance, and Jessica Linley

A Force-Directed Layout for Community Detection
with Automatic Clusterization ........................................................................ 49
Patrick J. McSweeney, Kishan Mehrotra, and Jae C. Oh

Comparing Two Sexual Mixing Schemes for Modelling
the Spread of HIV/AIDS ............................................................................. 65
Shah Jamal Alam and Ruth Meyer

Exploring Context Permeability in Multiple Social Networks .................... 77
Luis Antunes, João Balsa, Paulo Urbano, and Helder Coelho

A Naturalistic Multi-Agent Model of Word-of-Mouth Dynamics ........... 89
Samuel Thiriot and Jean-Daniel Kant

Part II  Economy, Market and Organization

Introducing Preference Heterogeneity into a
Monocentric Urban Model: An Agent-Based Land Market Model .......... 103
Tatiana Filatova, Dawn C. Parker, and Anne van der Veen
The Agent-Based Double Auction Markets: 15 Years On .......................... 119
Shu-Heng Chen and Chung-Ching Tai

A Doubly Structural Network Model and Analysis on the Emergence of Money ................................................................. 137
Masaaki Kunigami, Masato Kobayashi, Satoru Yamadera, Takashi Yamada, and Takao Terano

Analysis of Knowledge Retrieval Heuristics in Concurrent Software Development Teams ..................................................... 151
Shinsuke Sakuma, Yusuke Goto, and Shingo Takahashi

Reputation and Economic Performance in Industrial Districts: Modelling Social Complexity Through Multi-Agent Systems ............ 165
Gennaro Di Tosto, Francesca Giardini, and Rosaria Conte

Part III Modeling Approaches and Programming Environments

Injecting Data into Agent-Based Simulation .............................................. 179
Samer Hassan, Juan Pavón, Luis Antunes, and Nigel Gilbert

The MASON HouseholdsWorld Model of Pastoral Nomad Societies ...................................................................................... 193
Claudio Cioffi-Revilla, J. Daniel Rogers, and Maciek Latek

Effects of Adding a Simple Rule to a Reactive Simulation ...................... 205
Pablo Lucas

Applying Image Texture Measures to Describe Segregation in Agent-Based Modeling ................................................................. 213
Kathleen Pérez-López

Autonomous Tags: Language as Generative of Culture ............................. 227
Deborah Vakas Duong

Virtual City Model for Simulating Social Phenomena ............................ 253
Manabu Ichikawa, Yuhsuke Koyama, and Hiroshi Deguchi

Modeling Endogenous Coordination Using a Dynamic Language ............ 265
Jonathan Ozik and Michael North

Author Index ............................................................................................. 277

Keyword Index .......................................................................................... 279
WCSS’08 Organization

Chairs

Claudio Cioffi-Revilla, George Mason University, USA
Guillaume Deffuant, Cemagref, France

Program Committee Co-Chairs

David Hales, University of Bologna, Italy
David Sallach, Argonne National Laboratory, USA
Keiki Takadama, The University of Electro-Communications, Japan

Program Committee

North America (NAACSOS):
Steven Bankes, Evolving Logic
Kathleen Carley, Carnegie Mellon University
Daniel Diermeier, Northwestern University
Deborah Vakas Duong, US-OSD Simulation Analysis Center
William Griffin, Arizona State University
Stephen Guerin, Redfish Group
Marco Janssen, Arizona State University
Charles Macal, Argonne National Laboratory
Michael North, Argonne National Laboratory
Jonathan Ozik, Argonne National Laboratory
Dawn C. Parker, George Mason University
Michael Prietula, Emory University
William Rand, Northwestern University
Dwight Read, University of California at Los Angeles
Robert Reynolds, Wayne State University
Fabio Rojas, Indiana University
Kevin Ruby, University of Chicago
Keith Sawyer, Washington University

Asia and Pacific (PAAA):
Shu-Heng Chen, National Chengchi University, Taiwan
Sung-Bae Cho, Yonsei University, Korea
Norman Foo, University of New South Wales, Australia
Scott Heckbert, Commonwealth Scientific and Industrial Research Organisation, Australia
Toshiyuki Kaneda, Nagoya Institute of Technology, Japan
Toshiji Kawagoe, Future University-Hakodate, Japan
Hajime Kita, Kyoto University, Japan
Yusuke Koyama, Tokyo Institute of Technology, Japan
Deddy Priatmodjo Kusrindartoto, Institut Teknologi Bandung, Indonesia
Hiroyuki Matsui, Kyoto University, Japan
Yoshihiro Nakajima, Osaka City University, Japan
Philippa Pattison, The University of Melbourne, Australia
Utomo Sarjono Putro, Institut Teknologi Bandung, Indonesia
Hiroshi Sato, National Defense Academy, Japan
Shingo Takahashi, Waseda University, Japan
Takao Terano, Tokyo Institute of Technology, Japan
Sun-Chung Wang, Academia Sinica, Taiwan
David W. K. Yeung, Hong Kong Baptist University and St. Petersburg State University, China
Suiping Zhou, Nanyang Technological University, Singapore

Europe (ESSA):
Frederic Amblard, University of Toulouse, France
Luis Antunes, University of Lisbon, Portugal
Olivier Barreteau, Cemagref, France
Francois Bousquet, CIRAD, France
David Chavalarias, Ecole Polytechnique, France
Helder Coelho, University of Lisbon, Portugal
Rosaria Conte, CNR Rome, Italy
Nuno David, ISCTE, Lisbon, Portugal
Alexis Drogoul, IRD, France
Bruce Edmonds, CPM Manchester, UK
Nigel Gilbert, University of Surrey, UK
Nick Gotts, The Macaulay Institute, Aberdeen, UK
Dirk Helbing, ETH Zurich, Switzerland
Luis R. Izquierdo, University of Burgos, Spain
Wander Jager, University of Groningen, Netherlands
Juergen Kluever, University of Essen, Germany
Scott Moss, CPM Manchester, UK
Mario Paolucci, CNR Rome, Italy
Juliette Rouchier, GREQAM, CNRS, France
Frank Schweitzer, ETH Zurich, Switzerland
Jaime Sichman, University of Sao Paulo, Brazil
Flaminio Squazzoni, University of Brescia, Italy
Klaus G. Troitzsch, University of Koblenz, Germany
Local Organisation Committee

Robert Axtell
Dawn C. Parker
Maksim Tsvetovat
Christina Bishop
Beth Groenke